DOCUMENT RESUME

ED 107 116 FL 006 408

AUTHOR Lorentz, James P.
TITLE A Deviant Phonological System of English. Papers and Reports on Child Language Development, No. 8.
INSTITUTION Stanford Univ., Calif. Committee on Linguistics.
PUB DATE Jun 74
NOTE 11p.

EDRS PRICE MF-$0.76 HC-$1.58 PLUS POSTAGE
DESCRIPTORS Articulation (Speech); *Child Language; Distinctive Features; English; *Language Development; *Language Handicaps; Linguistic Performance; Phonemics; Phonetics; *Phonology; Pronunciation; *Psycholinguistics; Speech Pathology; Structural Analysis

ABSTRACT

This is a report on the deviant phonological system of a 4-year-old child. Although this system is characterized by deletions, assimilations, simplifications, and distortions, there is a regularity in the system which lends itself to systematic phonological analysis. Based on an examination of sample phonological deviations, the following rules are generalized. (1) In word initial environments: nasals, /l/, and /h/ are not distorted; stops are not deleted, but voiceless stops are generally unaspirated; all other segments are realized as either [l] or [w], except voiced 'predental' fricatives, which are reduced to stops, and initial preconsonantal fricatives which are deleted. (2) In word final and word medial environments: word final consonants are deleted when they follow another consonant; word final or medial fricatives after syllabic nuclei are deleted if voiced, or realized as [h] if they are voiceless; word final or medial stops occurring between syllabic nuclei are reduced to glottal stop if voiceless, or deleted completely if voiced; in word final position before silence or a word which begins with a consonant, stops are generally reduced in the same manner, but to a much lesser degree. Such a study is deemed important because it provides information for further phonological research. (Author/AM)

ED107116

FL006408

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

A DEVIANT PHONOLOGICAL SYSTEM OF ENGLISH

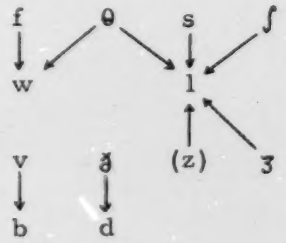
James P. Lorentz
Department of Linguistics
University of California at Berkeley

This paper reports on the deviant phonological system of a four year old boy named David.[1] David's phonology is characterized by numerous deletions, assimilations, simplifications and distortions. These processes, which render David's speech almost completely unintelligible, are, however, regular in application and consequently subject to systematic phonological analysis.

The degree of deviance of this phonological system can best be appreciated by consideration of the simple fact that it is only the nasals and vowels in David's speech which are generally realized in all phonological environments in a mostly normal manner. All other phonological segments occur on the surface in some deviant or distorted way -- the nature of the deviance, that is, the exact phonetic composition of the surface phone, being controlled by the different phonological environments in which the segment is found.

Consider, first of all, the phonetic realization of segments which occur in various word initial environments. Under 1.-3. in the Appendix, are examples of fricatives in word initial position before a syllable nucleus. The examples in 1. show that the voiced fricatives /v/ and /ð/ are realized as [b] and [d] respectively. In 2. we see that the voiceless fricatives /f/ and /θ/ generally become [w], however, /θ/ is also realized as [l] in words like 'thing' and 'think'. In 3. examples for /s/, /ʃ/, and /ʒ/ show that these segments are systematically reduced to [l].

Chart 1:



(/z/ is in parentheses because there is only indirect evidence in the data for its realization as [l] in this environment)

Chart 1 is a graphic representation of the various phonetic realizations of these word initial fricatives. It is clear from a glance at this chart

[1] These data were collected during May and June, 1971.

that the voiced fricatives /v/ and /ð/ behave quite differently from the other fricatives. That is, whereas /v/ and /ð/ are realized as homorganic voiced stops, all other fricatives are systematically reduced to a relevant homorganic sonorant.

This substitution of voiced stops for /v/ and /ð/ is a very common rule in child phonology; nevertheless, this asymmetrical realization of fricatives is striking. It suggests that the rule realizing /v/ and /ð/ as stops was well established in David's phonology when the more general fricative → sonorant rule emerged in David's speech.

If we divide the vocal tract up into two parts at the dental point of articulation, then we can say quite generally that 'pre-dental' voiceless fricatives are reduced to [w], whereas all 'postdental' fricatives are realized as [l]. /θ/ is phonetically predental and is, consequently, normally realized as [w]. The only environment in which /θ/ becomes [l] is before high, front vowels, such as in 'think' or 'thing.' Apparently, the effect of a following high front vowel is to retract /θ/ to a postdental position. Under this condition, then, /θ/ is treated just like any other postdental fricative and is realized as [l] in this environment. Rule (1), which must precede rule (2), converts /θ/ to postdental in the environment before high front vowels.[2] Rule (2) realizes postdental fricatives as [l], predental voiceless fricatives as [w]. Rule (3) changes voiced predental fricatives to stops.

(1) $/\theta/ \longrightarrow [+\text{postdental}] \;/\; \#__ \begin{bmatrix} V \\ +\text{high} \\ +\text{front} \end{bmatrix}$

(2) $\left\{ \begin{bmatrix} +\text{fricative} \\ +\text{postdental} \end{bmatrix} \longrightarrow [l] \right.$
$\left. \begin{bmatrix} +\text{fricative} \\ +\text{predental} \\ -\text{voice} \end{bmatrix} \longrightarrow [w] \right\} \Big/ \; \#\,(C)\,__SN$

(3) $\begin{bmatrix} +\text{fricative} \\ +\text{predental} \\ +\text{voice} \end{bmatrix} \longrightarrow [+\text{stop}] \;/\; \#__$

---

[2] An alternative to rule (1) is simply to convert /θ/ to [s] before high front vowels, and /θ/ to [f] elsewhere. These derived segments are then further reduced by rule (2) to [l] and [w] respectively. This solution might be attractive if there were any evidence that at some time in the past David had realized /θ/ as [f] or [s]. Such evidence, however, does not exist, and it seems that the simple conversion of /θ/ to 'postdental,' as in rule (1), is the most neutral expression of the facts.

The optional consonant in the environment of rule (2) allows the fricatives ʃ and ʒ to be subsumed under this general rule whenever they occur in word initial affricates (/tʃ/, /dʒ/).

The examples under 4. show initial fricatives followed by consonants. In this environment, fricatives are always deleted. Rule (4) formalizes this simple fact.

(4) [+fricative] $\longrightarrow$ ∅ / # __ C

Consider next the various changes which sonorants undergo when they occur in word initial environment. In 5. we have examples of initial /y/ and /r/. /y/ is generally realized as [l] in this environment, thus falling together quite naturally with the postdental fricatives. This simple substitution is stated in (5).

(5) /y/ $\longrightarrow$ [l] 1 # __

/r/ presents a much more complicated picture in this same environment. It is realized variously as [r], [w], an intermediate sound between [r] and [w] (represented in the examples as [w/r]), and occasionally even as [l]. There are several apparent restrictions on the distribution of these variants of /r/; however, the data base is too small to draw firm conclusions. For example, [w] is the only variant which occurs when a consonant ends the preceding word, and [l] only occurs when followed by a front vowel. Unfortunately, the number of examples for both cases is too small to allow general conclusions, and it is only possible to state the variations, as in (5a).

(5a) /r/ $\longrightarrow$ [r~w~w/r~(l)] / # ___

Under 6. we have examples of /r/ and /w/ when they occur after word initial consonants. These examples show that /r/ and /w/ are generally neutralized to [l] in this environment. /l/ itself it always preserved in this position, for example, 'play' is simply [pley]. Rule (6) states the simple fact that all sonorants which can occur in this environment are neutralized to [l]. Rule (6), of course, must apply after rule (4) which deletes initial fricatives before consonants.

(6) [+sonorant] $\longrightarrow$ [l] / # C___

One can summarize the facts about word initial environments in this phonology as follows:

a. Nasals, the lateral /l/, and /h/ are not deleted or distorted in any way.

b. Stops are also not deleted; however, voiceless stops are generally unaspirated.

c. All other segments are realized as either [l] or [w], except voiced 'predental' fricatives, which are reduced to stops, and initial preconsonantal fricatives which are deleted.

Consider next the phonological processes which occur word finally and word medially. Under 7. of the Appendix are listed a variety of examples for the occurrence of fricatives and stops in word final position following consonants. In this environment, stops and fricatives are systematically deleted. This fact is stated in rule (7).

(7) $C \longrightarrow \emptyset \; / \; C __ \#$

Rule (7) applies repeatedly and wherever possible, reducing all final consonant clusters to one segment. Rule (4), which deletes initial fricatives before consonants, complements rule (7) in that both rules systematically reduce consonant clusters at word boundaries. A word like 'stamps,' for example, is pronounced [tæm].

Under 8. of the Appendix are listed examples of cases where fricatives occur both word finally and word medially after syllabic nuclei. An examination of these data reveals a very general rule: Voiced fricatives are deleted in this environment, voiceless fricatives are realized as [h].

(8) $\left\{ \begin{array}{l} \left[\begin{array}{l} +\text{fricative} \\ +\text{voice} \end{array} \right] \longrightarrow \emptyset \\ \left[\begin{array}{l} +\text{fricative} \\ -\text{voice} \end{array} \right] \longrightarrow [h] \end{array} \right\} \Big/ \; SN __ (\#)$

This [h], of course, is merely a convenient way of representing what is, in reality, a quantitatively partial devoicing of the vowel. The only general exception to this rule is that in word final position, /θ/ is simply deleted. The failure of /θ/ to be realized as [h] in this environment may simply reflect the fact that /θ/ and /ð/ do not normally contrast in this position. In medial position, where /θ/ and /ð/ do contrast, /θ/ is realized as [h].

Under 9. we have examples of stops which occur word finally and word medially between syllabic nuclei. An examination of these examples shows variation occurring between fully preserved stops, glottal stop and complete deletion. Where variation is an integral part of the phonological process, as it is in this case, it is necessary to express

this variation as percent occurrence of the total number of cases. Chart 2 shows the percentage of cases in which the various stops are reduced to glottal stop or zero in word final position between syllabic nuclei. Chart 3 is for stops which occur word medially between syllabic nuclei. A segment in parentheses, such as the glottal stop under /p/ in Chart 2, indicates that the number of cases is too small to allow for a meaningful expression in terms of percentage. A line under a stop, such as /b/, Chart 3, indicates that no meaningful variation occurs for that stop in that environment. These percentages are derived from counting word types, not word tokens. Percentages based upon work tokens would, in general, tend to simply increase the percentage in the direction of stop reduction. These percentages are approximations.

Chart 2. Stops: SN__#SN

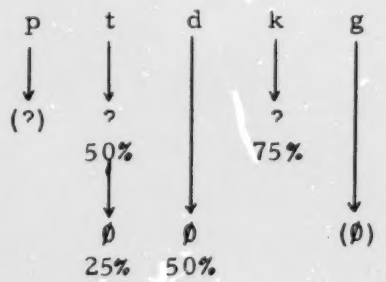
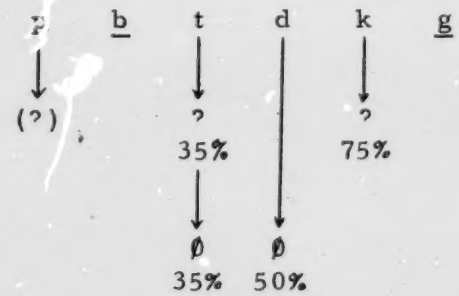


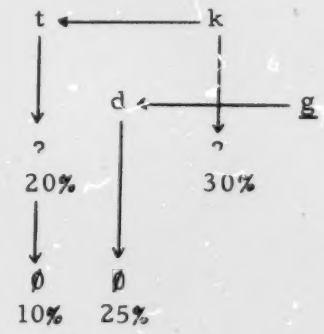
Chart 3. Stops: SN__SN



Several general conclusions can be drawn from the information represented in Charts 2 and 3. When voiceless stops are reduced, they are generally reduced to glottal stop. When voiced stops are reduced they are deleted completely. The percentage of reduction for all stops is approximately the same in both charts, and consequently one can conclude that stop reduction in word final or word medial position between syllabic nuclei is essentially one process. In both environments it appears that voiced stops are better preserved than voiceless stops.

Chart 4 indicates what happens to stops in word final position before silence, or a word which begins with a consonant. Again, in general, if voiceless stops are reduced, they are reduced to glottal stop, whereas voiced stops are simply deleted. In this environment, general stop reduction occurs far less frequently than in the environment for Charts 2 and 3. This indicates that in David's speech, words which are pronounced in isolation, or at the end of a phrase are in general, better preserved that words which are embedded within a phrase. Chart 4 also shows an assimilation of velars to alveolar position. This assimilation generally occurs whenever an alveolar is found in the same word as the velar. Examples of this assimilation are given under 10. in the Appendix.

Chart 4. Stops: SN __ # $\left\{\begin{matrix} C \\ \| \end{matrix}\right\}$



The following general conclusions can be made with regard to word final and word medial environments in this phonology.

a. Consonants which occur word finally are deleted when they follow another consonant.

b. Fricatives which occur word finally or word medially after syllabic nuclei are deleted if they are voiced, or realized as [h] if they are voiceless.

c. Stops which occur word finally or word medially between syllabic nuclei are variably reduced to glottal stop if voiceless, or deleted completely if voiced.

d. In word final position before silence or a word which begins with a consonant, stops are generally reduced in the same manner, but to a much lesser degree.

The characteristic trait of this phonology in medial and final environments is a general reduction of consonants if they are voiceless, and a general deletion of consonants if they are voiced. The characteristic trait of this phonology in word initial environments is the general reduction of fricatives and sonorants to the sonorants [ ] or [w].

These, then, are the major regularities of this deviant phonological system. There are, however, quite a number of subregularities, such as a general lowering of front vowels before liquids or the realization of syllabic /l̩/ as a mid or high back vowel in final position. There are also several quite interesting morphological regularities, such as the consistent actual realization of phonetic [ʃ] in the one word 'she,' or the consistent occurrence of phonetic [s] in 'to see,' but nowhere else. In contrast, the word 'sea,' meaning body of water, and 'c,' letter of the alphabet, are always and only realized with [l] in initial position. Such morphological peculiarities, perhaps, simply reflect the relative importance of certain vocabulary items.

The rules presented here account for the vast majority of surface realizations of segments in various phonological environments. However, this does not mean that these rules operate in some absolute manner. In fact, variants occur for almost every segment at one point or another in the data, and are usually in the direction of the correct pronunciation for the particular segment in question.

In conclusion, it seems appropriate to make a few comments on why the detailed study of such deviant phonological systems is important:

a. Provided that therapy in speech pathology is based on phonological analysis to some extent, then it seems likely that the more explicit and precise the analysis of the deviant phonological system is, the easier it will be to structure therapy to fit the particular dynamics of the child's phonological system. And by extension, if a fairly large number of well documented studies of such deviant phonologies are available for analysis, then it seems possible that specific refinements of therapeutic techniques, or even innovations in therapeutic techniques, might be hoped for.

b. A logical, central goal of speech pathology ought to be a general characterization of the nature of deviant phonological systems: how they are structured, how they change, what general or specific restrictions determine the form and range of application of phonological rules, and so on. It seems to me that the greater the number of explicit, well documented accounts of deviant phonologies which exist, the more likely the eventual attainment of this goal becomes.

c. From a linguistic point of view, the study of deviant phonologies provides valuable information about phonological universals, specifically the nature and variety of phonological rules, the possible types of phonotactic structures, and the possible kinds of segments and segment classes.

d. Such studies can also provide specific information which bears directly on unresolved questions concerning the actual phonological structure of specific languages. For example, one unresolved question of English phonology concerns the phonemic status of affricates. It seems to me that David's treatment of affricates, for example, does not support the notion that affricates in English are phonemic units.

e. Finally, it would seem that diachronic linguistics could make valuable use of detailed analyses of deviant phonological systems in the determination of the possible or likely direction of sound change in specific languages. Thus, it would not be surprising if those segments and those environments which are most commonly involved in the operation of deviant phonological rules were also the very segments and environments in which actual sound changes in the language were most likely to occur.

APPENDIX

Word initial environments

Fricatives: #(C) __ syllabic nucleus (SN)

1. /v/ very [bɛriy], visit [bɪɪt]
   /ð/ the [də], there [dɛr], this [dɪʰ]
2. /f/ for [wor], foot [wʊt], fish [wɪʰ], fence [wɛn] fur [wr̩]
   /θ/ thumb [wəm], thirty [wr̩diy]; but thing [lɪŋ], think [liy:]
3. /s/ sing [lɪŋ], such [lət], so [low], say [ley], soft [lɔʰ]
   /ʃ/ shell [læl], sure [lr̩], sharp [larp], sheep [liyp]
   and chick [tlɪt], chin [tlɪn], chest [tlɛʰ]
   /ʒ/ just [dlɪʰ], Johnny [dlɔniy], joy [dloy], gent'e [dlɛn?ow]

Fricatives: # __ C

4. /f/ fleece [liyʰ], float [lowt], fly [lay], friend [wɛn]
   /θ/ three [wih]
   /s/ sweet [wiyt], *snow [now], Spain [peyn], still [tɪl], sky [kay]

Sonorants: # __

5. /y/ yes [lɛ^{h}], you [luw], your [lɹ̥], yellow [lɛl]
   /r/ run [wən], [rən], [w/rən], [læn]; read [wiyd], [riy]
   railroad [weywowd], [reywowd]; rest [w/rɛ:], [lɛ^{h}]

Sonorants: #C __

6. /r/ pretty [plɪtiy], brother [blə?ɹ̥], true [tluw], grow [glow]
   /w/ twelve [tlɛl], twinkle [tl:ŋ?ow], queen [kliyn]

Word final and word medial environments

Fricatives and stops: C __#

7. /v/ twelve [tlɛl]
   /p/ lamp [læm], stamps [tæm]
   /s/ fence [wɛn], ruts [nət], keeps [kiyp], stamps [tæm]
   /t/ want [wan], soft [lɔ^{h}], just [d ɪ^{h}], kept [kɛp], danced [dæn]
   /z/ pins [pɪn], grains [gleyn], rides [wayd], loves [lə]
   /d/ and [æn], sand [læn], hand [hæn]
   /ʃ/ Welsh [wæl], each [iyt], watch [wat], such [lət]
   /k/ pink [pɪŋ], ink [ɪ:ŋ]

Fricatives: SN __(#)

8. /f/ if [ɪ^{h}], wife [way^{h}], off [ɔ^{h}], knife [nay^{h}], laugh [læ^{h}]
   after [æ^{h}?ɹ̥], sofa [low^{h}ə]
   /v/ of [ə], love [lə], have [hæ], gave [gey], five [way]
   every [ɛiy], seven [lɛn], David [deyɪd]
   /θ/ teeth [tiy], with [wɪ], blacksmith [b æ?mɪ$^{(h)}$]
   nothing [ne^{h}ɪŋ], healthy [hæw^{h}iy], wealthy [wæw^{h}iy]
   /ð/ mother [mə:ɹ̥], other [əɹ̥], together [tuwgɛɹ̥]
   /s/ yes [lɛ^{h}], this [dɪ^{h}], grass [glæ:^{h}], mice [may^{h}]
   master [mæ^{h}?ɹ̥], nesting [nɛ^{h}?ɪŋ], glasses [glæ^{h}?ɪ^{h}]
   /z/ is [ɪ:], bees [biy], use [luw], toys [toy], goes [gow]
   pleasant [plɛən], buzzing [bəɪŋ], visit [bɪɪt]
   /ʃ/ fish [wɪ^{h}], wash [wa^{h}], ocean [ow^{h}ɛn], fishes [wɪ^{h}ɪ^{h}]

Stops: SN __ (#)SN

9. /p/ up a [ə?ə], sheep in [liy?ɪn], up in [əpɪn]
happy [hæ?iy], apple [æ?owl], apple [æpuw], upon [əpɔn]
/b/ about [əbɜwt], cupboard [kəbɹd]
/t/ it is [ɪ?ɪ], but I [bəay], dirt in [dɹtɪn]
kitten [kɪ?ɪn], daughter [dɔɹ], pretty [pːɪtiy]
/d/ afraid of [əweyə], had a [hæə], ride in [ɹaydɪn]
/k/ make up [mey?ə?], back at [bæ?æt], Duke is [duwkɪ]
licky [lɪ?iy], crickets [klɪ?ət], because [biykə]
/g/ big and [bɪæn], egg each [eykkiyt], together [tuwgɛɹ]

Velar stops: Alveolar stop X SN__# (where X contains no #)

10. duck [dət], dog [dad], truck [tlɛt], chick [tlɪt]